1934

A study of some factors affecting the production and marketing of Louisiana carrots

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JUNE, 1934 BULLETIN 251

A Study of Some Factors Affecting the Production and Marketing of Louisiana Carrots

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Part I

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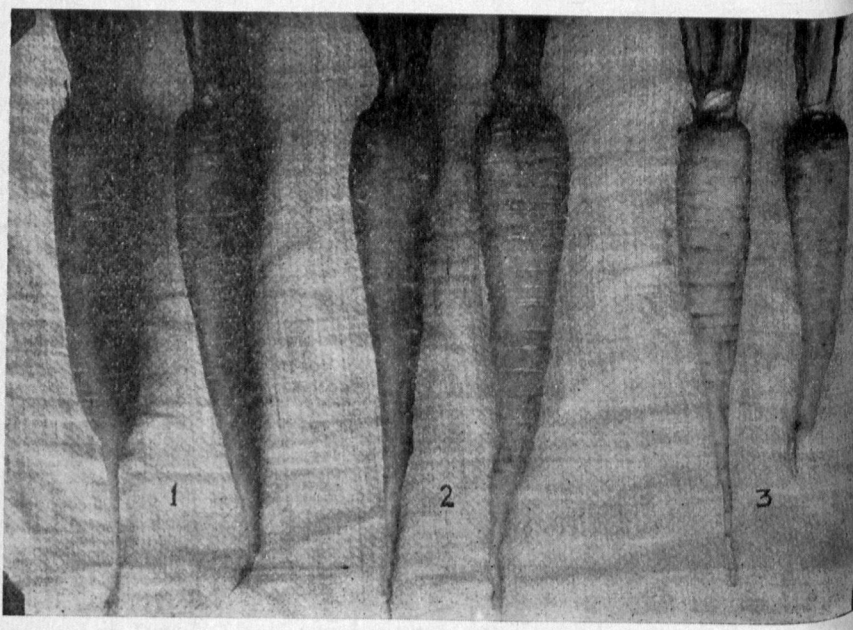

Grades of roots according to color

1. Color desired in all markets.
2. Minimum color allowed in the U. S. No. 1 grade.
3. Not wanted in the markets and not allowed in the U. S. No. 1 grade.

PART I

SOME FACTORS AFFECTING CARLOT PRICES OF BUNCHED CARROTS*

INTRODUCTION AND OBJECT OF STUDY

A study of the carrot shipments during recent years shows that the volin the United States increased from 1603 cars in 1920 to 12,341 cars in 1930, since which time it has dropped off slightly, no doubt due to the reduced buying power of the American people. Carrots have been lauded by the medical and home economics people as containing a high vitamin content, which publicity probably has been responsible for a large portion of the increase.

Analyzing the shipment figures still more closely it will be found that carrot shipments originate during all months of the year but are heaviest for the months of October to June. California, Texas and New York ship the largest volume during this period.

Mr. H. W. Poulsen, the California Supervising Inspector, states that in 1921 California produced only about 1% of the carrots used in the United States. By 1927 this percentage had increased to 42.4 per cent.

The volume of carrots shipped from Louisiana during the period 1920 to 1932 increased from 28 carloads in 1920 to 176 in 1927, since which time it has been gradually dropping off. In 1932 the carrot shipments amounted to only 17 carloads.

Several times during the 1930-31 shipping season shippers reported the fact that Louisiana carrots were selling in the terminal markets for approximately $1.00 a crate below what the same volume was bringing from California and Texas. This study was, therefore, undertaken to determine if possible whether or not Louisiana is in a position to produce root crops competitively with California, New York and Texas, and if so, what are the factors causing the low prices being received for the Louisiana products.

INFORMATION AND DATA SECURED CONCERNING COMPETING AREAS

California

California carrots are grown on ridges with 2 rows on each ridge. When harvested, small shovels are mounted on a cultivator frame in such a manner that when the machine runs over the field it throws the soil on each side of the ridge away from the carrot rows, so that the carrots may be easily pulled out by hand. Labor is paid from 5c to 6c per dozen bunches for pulling, grading and tying the carrots and gathering them into field crates. The usual method is for the men to pull a row of carrots, grade them as to size, eliminate the defective carrots, and then tie them into bunches with raffia.

*Parts I and II of this Bulletin are portions of two masters' theses presented by the first two authors.

Each man must be familiar with the various grade defects to enable him to properly discard carrots which are misshapen, or show decay, insect injury, unhealed growth cracks, serious green discoloration, mechanical injury or discolored tops.

Uniformity of size also is required as there must not be a variation of more than ½ inch in diameter between individuals in any bunch. It is also important that all yellow, dead and dried leaves be removed so that the bunches will present a fresh appearance when the crates are opened in the markets.

The number of carrots tied into a bunch depends upon the size of the carrots, but the bunches must be of such a size that 5 dozen bunches, together with the crushed ice, will fill a standard Los Angeles lettuce crate full enough to produce a good bulge. At the present time 8 to 12 carrots averaging ¾ to 1 inch in diameter, 6 to 8 carrots averaging 1 to 1½ inches in diameter, and 4 to 6 carrots averaging 1½ to 2 inches in diameter constitute the ordinary size bunches. Relatively short bushy tops are preferred.

After the carrots have been bunched and placed in field crates, they are hauled with as little delay as possible to central packing houses where they are thoroughly washed to remove all foreign matter. The most common method is to plunge the bunches in and out of large vats of clear running water. This works satisfactorily with carrots grown in loose, sandy soil but carrots grown in heavy, sticky soil require that the bunches be piled in pyramid form with the roots out and then washed with a high pressure stream from a hose. In some cases it has even been found necessary to reverse the bunches and wash them a second time. The washed carrots are then packed into paper lined lettuce crates in 3 layers. The bottom 2 layers, each containing 2 dozen bunches, have a shovel-full of ice placed between them, after which, another shovel-full of ice is added, and the remaining dozen arranged on top. Occasionally, a little ice is placed over the tops of the carrots before the paper is folded over and the lid nailed. The usual load is 348 to 360 crates, with the crates loaded on edge.

The most popular varieties are the Danvers Half Long and the Chantenay. The average yield in California is 250 lettuce crates per acre, with a usual range from 150 crates to over 300 crates. One exceptional yield was reported of over 500 lettuce crates to the acre.

In California it is estimated that a grower can produce carrots at a cost of 25c to 35c per crate, or at a rate of $60.00 to $85.00 per acre for the spring crop up to harvesting time. It has been found that the average spread between prices paid the grower and f. o. b. prices is 90c and represents the harvesting, tying, packing and loading charges plus the shipper's profit.

California carlot shipments of carrots can originate during any season of the year. This means that the California product is a competitive factor to be taken into consideration at all times, but apparently many carrots are produced locally in the areas surrounding terminal markets during the

months of July, August, and September, and the demand and shipment of California carrots during those months are light.

Texas

A study of the Texas carlot shipments shows that their main shipping season is confined to the period from Christmas until June 1st, with occasional cars going out earlier and a relatively few cars moving after the first week in June. For the period June 1, 1930 to June 1, 1932, 95c was the lowest f. o. b. price quoted and $2.75 was the highest price quoted, with most shipments during 1931-32 being quoted at approximately $2.00 per crate. One dollar and ten cents to $1.25 would probably be an average f. o. b. quotation for carrots for 1930-31 and $1.35 to $1.75 would be an average quotation for the 1929-30 season.

New York

The shipments of carrots from western New York do not show the same increase in volume which the California shipments have registered. The volume in 1920 was 1158 cars, rising to 2262 cars in 1924, since which time it has remained relatively stable until 1932 when it declined to 1400 cars. No doubt this was due to the low prices received during the 1931 shipping season. New York carrots are practically all storage carrots and are topped and shipped in 100 lb. sacks, or bushel baskets. Sales of washed carrots on wire orders ranged from 55c a bushel to $2.50 a bushel. The farmer usually receives approximately $10.00 to $20.00 a ton for rough bulk carrots. Topped carrots from western New York are sold mostly in the cities of Massachusetts, Rhode Island, Connecticut, New York, Ohio, Pennsylvania, Maryland and New Jersey. There are practically no shipments to points outside of this area.

Louisiana Methods Contrasted

As a contrast to the California methods described which insure a uniform number of bunches in a uniformly packed, neat container, examination of Louisiana carrots being packed at some of the larger shipping points in this state showed that the carrots were being unevenly bunched without regard to count or size and packed in bushel baskets. Several such containers examined showed an average of 25% to 30% grade defects consisting mostly of growth cracks, double roots, and sunburn. It was also found that the size of the roots in the average container ranged from ¾ of an inch to 2 inches in diameter. Due to the contents of such a container being highly bulged, after discarding the grade defects and rebunching there still remained approximately a bushel of U. S. No. 1 carrots, but the sizes varied and in most cases the carrots had not been washed sufficiently to present an attractive appearance.

An examination of loaded cars showed that the Louisiana containers, as being shipped, had the lids bulged so high that is was found difficult to properly stack the containers. This resulted in an unattractive and loose load. The weight of the top baskets caused the bottom ones to become pressed out

Figure 1

Baskets are too limber and are easily crushed out of shape, giving an unsightly package when unloaded and often spilling much of the contents.

of shape. In many cases, the carrots in the top of the baskets, due to the high bulge, worked loose and fell to the floor of the car and made repacking necessary at destination. In contrast to this, crates, being of rectangular and ridged construction, stack more satisfactorily and do not lose their contents.

Louisiana Carrots Discriminated Against Due to Off-Color

Another disadvantage confronting Louisiana growers and shippers is the fact that the markets want bunched carrots in largest volume during the winter months. In order to meet U. S. No. 1, carrots must be orange or reddish yellow in color. Our heavier soils will not produce such carrots during wet winter months. Numerous cases were noted, but one important example was found at Napoleonville where a New York City firm contracted for quite a large acreage of carrots to be delivered at that loading point. They agreed to take only U. S. No. 1 carrots. When the time came, during February, March and April, to deliver the carrots the growers estimated that they had 75 to 100 carloads of carrots available for shipment, but only a few cars were shipped, due to the light yellow color of the roots. The same lightness of color was not so noticeable in carrots produced for May and June delivery.

There are some sections of the state which seem to be able to produce a fairly dark colored carrot at almost any season of the year, but such areas are limited. In contrast to this it has been found that carrots produced in California are of a relatively dark color, probably due to the large amount of sunshine and the fact that water can be added or withheld as desired.

In Louisiana it was found that in practically any field examined, even though many of the carrots were light in color, individual carrots could be found of a sufficiently dark color to meet U. S. No. 1. This would indicate that there is a probable hereditary difference, and, that through selection, there could be developed a carrot which would be uniformly dark enough in color to meet the grade requirments.

Figure 2

Crates are stiff and do not bulge out of shape or lose their contents when cars are heavily loaded. A good paper lining improves the appearance of the pack and retards the melting of the ice, thus keeping the tops fresh and the roots crisp.

DIFFERENTIALS BETWEEN F. O. B. AND JOBBING PRICES

Jobbing quotations in the terminal markets of New York City, Philadelphia, and Chicago generally show a spread of $1.25 to $2.50 between the f. o. b. and the delivered prices of bunched carrots.

The total volume of produce which Louisiana is supplying to any one of these cities is small compared with their total receipts. Terminal prices are therefore being set by receipts from California, Texas, New York, and other large producing states. What the Louisiana product brings is reflected by its comparative value when sold in competition with the products from other states.

ACREAGE, YIELD PER ACRE, AND PRODUCTION STUDIES

A study of the acreage, yield per acre, and production figures indicates that California yields average about twice those obtained in Louisiana; and Texas yields are slightly higher than Louisiana yields. Most other competing states, with the exception of Mississippi, show average yields from 1½ times to nearly 3 times Louisiana yields. A partial explanation of the low yields reported for Louisiana is the fact that Louisiana growers plant on wide rows while California and Texas growers place the rows close together.

RESULTS OF TERMINAL MARKET INVESTIGATIONS

A questionnaire was prepared and sent to the various terminal markets asking for a report as to how Louisiana carrots compare with those received from other states. Replies were received from St. Louis, Kansas City, Chicago, Cleveland, Pittsburg and Philadelphia and indicated that there has been a marked improvement in the quailty of carrots received from Louisiana during the past few seasons, but it was stated that there was still room for further improvement.

Receivers in the markets reported that their trade would not accept Louisiana carrots even at reduced prices and preferred the California product, due to its clean appearance, uniform bunching, and being packed in more satisfactory containers. Retail merchants know when ordering a crate of California carrots how many bunches it contains and can easily figure out the price which they should receive in order to make a reasonable profit. Not only that, but due to the uniformity of size in the bunches in the California crates and the fact that grade defects are eliminated purchasers find one bunch about as acceptable as the next and there is little tendency for the customer to go through the pile on the counter in an effort to pick out a bunch better than the one first picked up.

Prices in the terminal markets in recent years have been such that the product received in the Los Angeles crate returns only a small profit to the original shipper after allowing for freight charges from California or Texas to the terminal markets. When Louisiana carrots are discounted at the rate of a dollar a crate, it eliminates practically all of the profits, even after allowing for the differential in freight rates. The result is California and Texas have been largely supplying the markets with bunched carrots and New York has been supplying the topped carrots.

The Chicago report stated that California carrots are preferred in that market, with Texas carrots second. It also reported that the Danver's Half

Long was the predominating variety. It further stated that during previous years the long type of carrot had been preferred but that there is now a tendency toward the shorter roots which are broad at the crown.

Samples of carrots taken from Louisiana, Califfornia and Texas cars in Cleveland were sent to the writers at Baton Rouge for observation and inspection. Cleveland reported that the market preferred the long type, medium sized, deep orange colored roots, with fresh green tops and uniformly sized bunches. Cleveland reported a range in price from $1.50 to $3.25 a crate and made the comment that it is hard for the average shipper to realize why there should be a range of $1.75 per crate for carrots from the same section. It was further commented that the differential was due entirely to the fact that the trade is buying and willing to pay $3.00 to $3.25 per crate for medium sized, uniform stock with fresh green tops which are bright in color.

The Cleveland report commented, that of the range of $1.50 to $3.25 per Los Angeles crate quoted, that the Louisiana carrots were selling around $2.25. This same market commented that Texas shippers are packing quite extensively in half lettuce crates and say that it is proving to be a very profitable container on that market and is preferred to the regular lettuce crate by many local buyers. The use of a heavy waxed paper liner is recommended, because it helps to keep the contents fresh and bright. Packages on display in which this paper is used also present an attractive appearance.

LOUISIANA'S EFFORTS TO CORRECT UNFAVORABLE FACTORS

Realizing that Louisiana was shipping an inferior grade of produce Mr. Allen Ellender, in 1928, introduced into the Louisiana Legislature a bill requiring the proper marking for grade of all fruit and vegetable packages being offered for shipment. Shipping point inspection was also offered to help growers and shippers put up a better grade. It was hoped that Louisiana would be able to regain markets lost through shipping inferior produce. Mixed vegetable shippers did not take advantage of the use of the inspection service during the 1928-29 shipping season, but did arrange to use inspection on practically all of the mixed vegetable products leaving the state beginning December 1, 1929. Since that time nearly a hundred per cent of these products have been shipped under inspection.

Prior to the time when shippers used inspection and bought on the basis of grade, buying methods delayed improvement. Farmers could always sell their product. No matter how poorly it was washed or graded, some shipper would accept his load and would pay the same price for it that was being paid for a properly graded product.

During the summer of 1932 a conference of mixed vegetable shippers, inspectors, extension service employees, experiment station employees and railway agricultural agents was called at Dr. C. T. Dowell's office to discuss this situation and as a result of this meeting 6 later meetings were called to outline the proper way to meet California and Texas competition. A table was worked out at these conferences showing the number of dozen bunches

which should be packed in each container, their relative size and the actual way in which they should be arranged in the containers. In the case of carrots it was recommended that the regular Los Angeles lettuce crate be packed with 5 dozen bunches, similar to the California method, and that in addition a 1 1/3 bushel crate be adopted which was to contain 3 dozen bunches of carrots (See Number 2 in Conclusion relative to the Half crate). The various railroads were notified of the dimensions of the smaller sized crate and were asked to publish tariffs for it.

One result of these conferences was a request from the shippers that the Louisiana State Market Commission pass an amendment to one of their already existing regulations, preventing the shipment of off-grade bunched and leaf produce, unless an official inspector's report showed that the product could not be graded economically. The amendment was adopted and has had a beneficial effect, both moral and psychological, upon both shippers and growers.

The shippers also agreed among themselves that a differential in price should be paid to growers between produce reported by inspectors to meet U. S. No. 1 and that failing to meet the grade. Shippers also agreed that insofar as possible no shipper would accept produce of an inferior quality.

CONCLUSIONS

1. The type of container and its appearance are important factors. The markets do not want bunched carrots and beets in bushel baskets. These products should be packed in the Los Angeles lettuce crate and the half lettuce crate. Crates should be paper-lined and two layers of crushed ice used in the full crate and one layer used in the half crate.

2. Uniformity of size of bunches is important. Bunches of mixed sizes and variations of count of bunches in containers are not wanted. Five dozen uniformly sized bunches is the proper count for the lettuce crate; and three dozen bunches is the proper count for the half crate.

3. Variety is an important factor. Carrots of the Chantenay and Danver's Half Long type are preferred, with the tendency toward the latter.

4. Size of root and uniformity of size within the bunch is important. Carrots ranging in size from ⅞ of an inch to 1½ inches in diameter are preferred.

5. Grade defects such as growth cracks, double roots, sunburn, and misshapen stock should be eliminated. A bright, clean appearance is also necessary.

6. Length and color of tops count. Short, green, bushy tops from which discolored or dead leaves have been removed are preferred for carrots.

7. Light colored roots are not acceptable. Louisiana shippers have experienced difficulty in securing dark colored carrots during the winter months. Until the Experiment Station has time to isolate and breed a uniformly dark colored carrot plantings should either be made for fall and

early winter, or late spring shipments when a darker colored carrot can be produced.

ADDITIONAL COMMENTS

1. Louisiana's small yields per acre are probably offset by the higher costs of production in California and Texas, resulting from the necessity of irrigating these crops in those states.
2. There is only a limited demand for the topped roots and New York will probably continue to supply this product. States close to the large terminal markets cannot produce the bunched product economically during the winter months and Louisiana's nearness to these markets insures a low freight rate when compared with other competing states.
3. By eliminating the unfavorable factors which are causing Louisiana's products to bring low prices, Louisiana can again ship in volume and at profitable prices.

PART II

SOME FACTORS INFLUENCING THE COLOR OF CARROTS

The Color of Carrots as Affected by Different Soil Types and pH Values

Seed was planted for this experiment October 6, 14, 15 and 16 at the Louisiana State University, Cut Off, Lockport, and Labadieville, respectively. A specially selected strain of the Danver's Half Long variety was used in all of the above plantings. At the Louisiana State University the carrots were grown on a bluff silty loam (pH 5.5), on a Sharkey clay soil (pH 6.2) at Labadieville, on a Sharkey fine sandy loam (pH 7.1) at Lockport, and on a Ridge silty clay (pH 5.0) at Cut Off.

The characteristic growth data on the roots and tops and the color were recorded at harvest time (January 25 to 30).

The types of soil and the pH values of each location of planting and the results obtained, showing particularly the color and the growth under the above mentioned conditions, are shown in Table 1.

Table 1. Influence of soil types and pH values on the color and growth of carrots.

Location and Soil	pH Value	Well colored %	Fairly well colored	Poorly colored	Number plants	Average wt. of roots (gms.)	Average wt. of tops (gms.)
Cut Off—							
Ridge silty clay	5.0	80.0	14.4	6.0	250	49.1	25.2
L. S. U.							
Bluff Silty loam	5.5	43.6	28.2	28.2	362	44.2	19.1
Labadieville—							
Sharkey clay	6.2	90.0	7.5	2.5	165	57.5	25.8
Lockport—							
Sharkey fine sandy loam	7.1	84.5	12.6	2.9	206	56.0	35.7

Results show that the Bluff silty soils at the Louisiana State University gave a significantly high per cent of "off-colors". That this condition is not due to the acidity of the soil is shown in the fact that good color is obtained on the Ridge silty clay at Cut Off where the soil was found to be more acid.

The results of this experiment show that the lowest yields were received on the more acid soils. Other investigators have shown that soils having a pH as low as 5.0 do not suppress the growth of carrots. Experiments conducted the following year by the Experiment Station on the bluff soils at L. S. U. showed that excess moisture, possibly resulting in insufficient aeration, was the cause of "off color".

COMPARATIVE COLORATION OF DIFFERENT VARIETIES AND STRAINS

This experiment was conducted on the Bluff silty loam at the Louisiana State University. The following varieties, with several stains each, were used in this experiment to get a comparison of the effect of the Bluff silty soils on the color of carrot roots: French Forcing, Oxheart, Scarlet Horn, Nantes, Chantenay, Danver's Half Long, Emperator, and Long Orange. Results were taken on the general coloration of the various varieties in the fall and spring plantings. It was found that the late fall grown carrots averaged about 25 to 30 per cent "off-colors" and all varieties and strains were affected equally. The spring grown carrots averaged about 10 to 15 per cent "off-colors".

SELECTION AND BREEDING FOR WELL COLORED CARROTS

It has been found that in most any field of carrots examined in this state that one would find "off-color" as well as good colored carrots. As shown in Table 1, a larger percentage of "off-colored" roots were found in the October planting on the Buff soils at Louisiana State University. In these same plots, however, there were individual carrots which possessed very good color. A number of the more ideal carrots of the Chantenay, Danvers Half Long and Long Orange varieties were selected for breeding purposes. The roots were planted to the breeding plot where a quantity of selfed and open pollinated seed were produced. The breeding work will be continued in an effort to develop a strain which will possess good color even when grown under the most adverse conditions.

PART III

PRODUCTION PROGRAM FOR LOUISIANA CARROTS

Varieties

The market is demanding a longer carrot and when sufficient seed is on hand the Danvers Half Long is recommended. When this variety is not available the Chantenay should be used.

Time of Planting

For early and mid-winter shipments, plantings should be made from August 20th to October 10th. Where possible, early planting is recommended. The spring crop should not be planted before January 20 and not later than February 15. For two reasons, it is not a safe practice to plant carrots for commercial use between October 10 and January 20: (1) Severe freezes and heavy rains are so often disastrous to the crop; (2) Carrots grown at this season of the year often are of unsatisfactory color and fail to pass shipping point inspection.

Soil Preference

The carrot thrives best in a deep, loose sandy loam soil. Such soils are favorable for the development of smooth carrots, while heavy soils are conducive to a heavy top growth and carrots which are forked, with many side roots.

Fertilizers

On a 3½ foot row basis, it is recommended that 400 to 600 pounds of a 4-8-4 or a 4-12-4 be used.

Preparation of Land and Planting

The soil should be in a good physical condition and smooth, free from coarse material. The rows should be wide enough and high enough to provide good drainage—3½ to 4 feet is recommended. The rows should be made up and settled by rain before planting.

Carrot seed are rather small and slow to germinate and therefore should not be planted deep. Just enough soil to cover the seed, ⅛ of an inch is sufficient. In order to obtain a good stand it is necessary to plant 2 to 3 pounds of seed per acre, planting a single drill of seed to each row.

Cultivation

Carrots grow very slowly at first and cannot compete with weeds and for this reason it is usually necessary to hoe them once. Where possible a very shallow cultivation would be cheaper. Two or three shallow cultivations are about all that are necessary. At the last cultivation, the soil should be brought up well around the tops of the roots to prevent them from greening.

INSECTS

The vegetable weevil (Listredires obliqures) does more damage to carrots than any other insect in Louisiana. It is in the larval stage that this insect does the most damage. The vegetable weevil is best controlled by dusting the infested carrot plants with calcium arsenate or barium fluosilicate. Field sanitation and crop rotation are next in importance in reducing the damage.

Diseases

The two diseases which cause the greatest losses in Louisiana are leaf spot **(Cercospera apii carotae)** and the blight **(Macrosporium carotae)**. These diseases are often present together on the foliage, and so from the market standpoint they constitute one disease.

These diseases cause their greatest losses during the late spring on carrots which are fully mature. They do not as a rule cause serious trouble during the fall, winter and early spring. These diseases are also worse on the old leaves of the older plantings, therefore, to avoid losses keep the field clean of old plants and have a succession of younger plantings coming along so that they may be marketed as soon as the roots reach the proper size to meet the grade requirements.